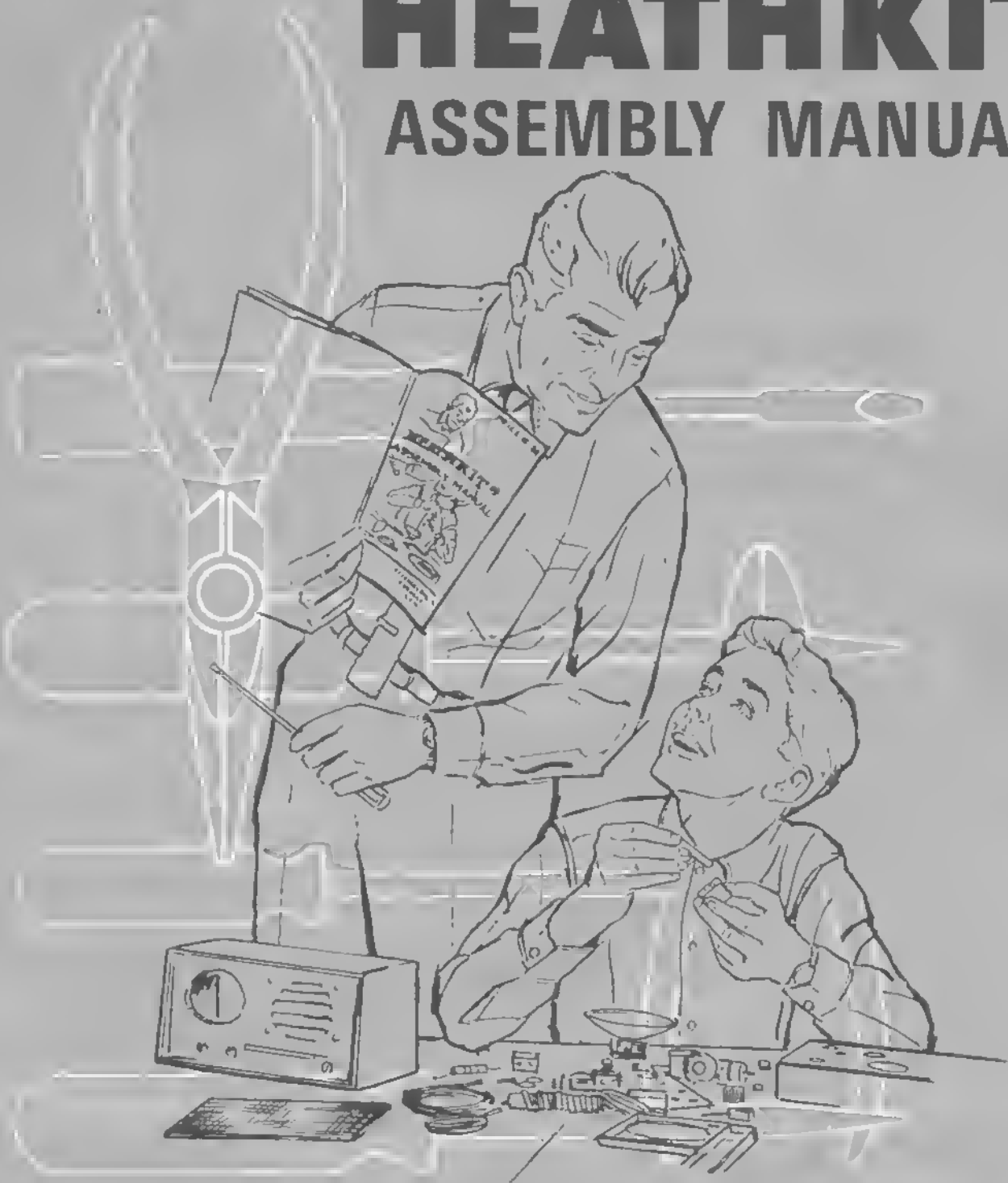


MODEL **GC-1005 Electronic Clock**

# **HEATHKIT<sup>®</sup>**

## **ASSEMBLY MANUAL**

HEATH COMPANY



PRICE \$2.00



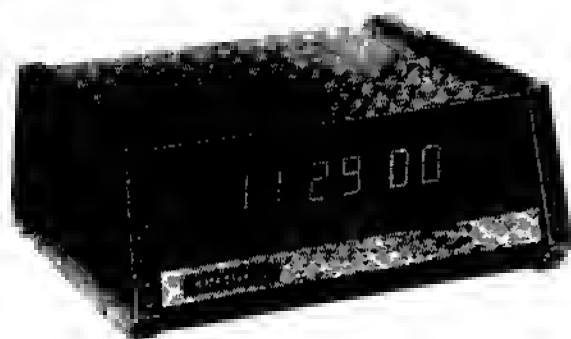
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I-595-1500-03

# Assembly and Operation of the



## ELECTRONIC CLOCK MODEL GC-1005



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HEATH COMPANY  
BENTON HARBOR, MICHIGAN 49022

## INTRODUCTION

The Heathkit Model GC-1005 digital Electronic Clock has many attractive features, including: a wiring option that lets it display either 12-hour or 24-hour time; an AM-PM alarm with snooze alarm; a 6-digit, easy-to-read display; a power interruption indication; a 50 or 60 Hz wiring option; and a 120-volt or 240-volt wiring option. The heart of the Clock is an MOS/LSI\* integrated circuit that performs all the logic functions of keeping time.

A simple wiring option lets your Clock display either 12-hour or 24-hour time. The clock "knows" the difference between AM and PM and will only sound the alarm for the one time (either AM or PM, but not both) in 24 hours that you desire. The snooze alarm waits approximately seven minutes each time it is reset, until it sounds again.

\*MOS/LSI (Metal Oxide Semiconductor/Large Scale Integration)

The readout tubes clearly display the time on a sloped surface, and the 6-digit display shows all 8's if there is a significant power line interruption. The Clock can be wired to operate from either a 50 Hz or a 60 Hz power line, or 120 volts or 240 volts AC.

Attractive, modern styling; small size; and solid-state dependability make this Clock ideally suited for your office, your home, or almost anywhere.

Refer to the "Kit Builders Guide" for complete information on unpacking, parts identification, tools, wiring, soldering, and step-by-step assembly procedures.

## PARTS LIST

Check each part against the following list. The key numbers correspond to the numbers in the Parts Pictorial (fold-out from Page 5). Any part that is packaged in an individual envelope with the part number on it should be placed back in the envelope after it is identified until it is called for in a step.

CAUTION: The integrated circuit (#443-601) can be damaged by static voltage. Do not handle it until you are told to do so.

To order a replacement part, use the Parts Order Form furnished with this kit. If a Parts Order Form is not available, refer to "Replacement Parts" inside the rear cover of the Manual.

KEY PART No.	PARTS No.	DESCRIPTION	PRICE Each
-----------------	--------------	-------------	---------------

### RESISTORS

NOTE: Each of the following resistors has a 10% tolerance unless otherwise noted. 10% is indicated by a silver fourth color band, while 5% is indicated by a gold band.

#### 1/4-Watt

A1	1-46-12	14	27 k $\Omega$ (red-violet-orange)	.10
A1	1-12-12	1	82 k $\Omega$ (gray-red-orange)	.10
A1	1-90-12	2	91 k $\Omega$ , 5% (white-brown-orange)	.10
A1	1-32-12	4	100 k $\Omega$ (brown-black-yellow)	.10
A1	1-16-12	7	180 k $\Omega$ (brown-gray-yellow)	.10

KEY PART No.	PARTS No.	DESCRIPTION	PRICE Each
-----------------	--------------	-------------	---------------

#### 1/2-Watt

A2	1-45	1	220 $\Omega$ (red-red-brown)	.10
A2	1-13	1	2700 $\Omega$ (red-violet-red)	.10
A2	1-114	2	8200 $\Omega$ , 5% (gray-red-red)	.20
A2	1-109	3	12 k $\Omega$ , 5% (brown-red-orange)	.20
A2	1-162	1	15 k $\Omega$ , 5% (brown-green-orange)	.10
A2	1-22	4	22 k $\Omega$ (red-red-orange)	.10
A2	1-23	1	27 k $\Omega$ (red-violet-orange)	.10
A2	1-47	2	56 k $\Omega$ (green-blue-orange)	.10
A2	1-121	13	120 k $\Omega$ (brown-red-yellow)	.10

KEY PART No.	PARTS No.	Per Kit	DESCRIPTION	PRICE Each
<b>Resistors (cont'd.)</b>				
A2	1-30	6	270 k $\Omega$ (red-violet-yellow)	.10
A2	1-33	6	470 k $\Omega$ (yellow-violet-yellow)	.10
A2	1-35	6	1 M $\Omega$ (brown-black-green)	.10

### CAPACITORS

A3	20-100	1	30 pF mica	.20
A4	21-163	6	.001 $\mu$ F disc	.10
A5	27-63	1	.022 $\mu$ F Mylar*	.10
A6	25-30	1	Dual 20 $\mu$ F electrolytic	1.00
A7	25-241	1	1200 $\mu$ F electrolytic	.90

### DIODES

B1	56-25	1	1N4166A zener	1.00
B1	56-56	8	1N4149	.20
B1	57-27	1	1N2071	.50
B1	57-65	2	1N4002	.20

### TRANSISTORS-INTEGRATED CIRCUIT

NOTE: Transistors and integrated circuits are marked for identification in one of the following four ways:

1. Part number.
2. Type number. (In integrated circuits this refers only to the numbers; the letters may vary.)
3. Part number and type number.
4. Part number with a type number other than the one listed.

B2	417-811	7	MPS-L01 transistor	.40
B2	417-295	6	MP5-L51 transistor	.50
B2	417-801	8	MP5-A20 transistor	.20
B3	443-601	1	MK5017AA integrated circuit	15.00

### SWITCHES-INSULATORS

84	60-1	1	5PST switch	.20
	60-6	3	SPST switch with spring return	.30
85	60-2	6	DPDT switch	.30
B6	75-52	6	Switch insulator	.10
B7	75-103	1	Fish paper, 5-1/2" x 1-7/8"	.10
B8	75-93	1	Fish paper, 1" x 1"	.10
B9	75-138	4	Rubber foot	.10

### CORD-WIRE-CABLE

89-44	1	Line cord	.55
-------	---	-----------	-----

\*DuPont Registered Trademark

KEY PART No.	PARTS No.	Per Kit	DESCRIPTION	PRICE Each
<b>Cord-Wire-Cable (cont'd.)</b>				
	340-11	1	Bare wire (used only for soldering iron tip)	.05/ft
	344-50	1	Black wire	.05/ft
	347-55	1	8-wire cable	.25/ft

### HARDWARE

C1	250-420	7	2-32 x 1/4" self-tapping screw	.05
C2	250-52	3	4-40 x 1/4" screw	.05
C3	252-2	3	4-40 nut	.05
C4	254-9	3	#4 lockwasher	.05
C5	250-276	12	6-32 x 3/8" flat head screw	.05
C6	250-381	2	6-32 x 3/8" black screw	.05
	250-89	1	6-32 x 3/8" screw	.05
C7	250-1156	4	6-20 x 2-1/4" self-tapping screw	.10
C8	252-3	3	6-32 nut	.05
C9	253-60	2	#6 flat washer	.05
C10	254-1	5	#6 lockwasher	.05
C11	259-1	6	#6 solder lug	.05

### CIRCUIT BOARDS-CABINET-LABELS

	85-1239-3	1	Main circuit board	1.65
	85-1240-2	1	Display circuit board	.85
D1	92-77	1	Cabinet top	1.20
D2	92-78	1	Cabinet bottom	1.10
D3	390-341	1	Heathkit label	.10
	390-362	1	Fuse label	.10
	390-926	1	Cord disconnect label	.15
	390-995	1	Wood-grain trim	.40
	391-34	1	Blue and white label	

### MISCELLANEOUS

	54-820	1	Power transformer	4.60
E1	204-1876	2	Angle bracket	.15
E2	205-141	2	Tool plate	.10
E3	258-167	2	Speaker clamp	.05
E4	346-6	1	Sleeving	.05
E5	401-163	1	Speaker	1.40
E6	411-286	3	Display tube	5.00
E7	412-11	1	Neon lamp	.20
E8	421-40	1	3/16-ampere slow-blow fuse	.40
E9	431-43	1	Terminal strip	.10
E10	432-134	56	Connector pin	.10
E11	432-144	24	Integrated circuit (IC) connector	.01
E12	432-199	1	Wire nut	.10

KEY PART No.	PARTS No.	PARTS Per Kit	DESCRIPTION	PRICE Each
<b>Miscellaneous (cont'd.)</b>				
E13	446-609	①	Window	1.20
	490-5	④	Nut starter	.10
	597-260	①	Parts Order Form	
	597-308	①	Kit Builders Guide	
			Manual (See front cover for part number.)	2.00
			Solder (Additional 6' rolls of solder, #331-13, can be ordered for 25 cents each.)	

The prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage, and handling. Outside the U.S.A., parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties, and rates of exchange.

## ASSEMBLY NOTES

- Before you start to assemble this kit, read the wiring, soldering, and step-by-step assembly information in the "Kit Builders Guide."
- Due to the small foil area around the circuit board holes and the small areas between foils, it will be necessary to use the utmost care to prevent solder bridges between adjacent foil areas. Use only a minimum amount of solder and use no larger than a 25-watt soldering iron with a small tip. Allow it to reach operating temperature, and then apply it only long enough to make a good solder connection.
- If a small wattage, small-tip soldering iron is not available, proceed as follows: Be sure your soldering iron is cool. Wrap the large bare wire (supplied) tightly around the soldering iron tip as shown in Figure 1. Allow approximately 1/4" of wire to extend beyond the end of the soldering iron. Cut the wire end to a

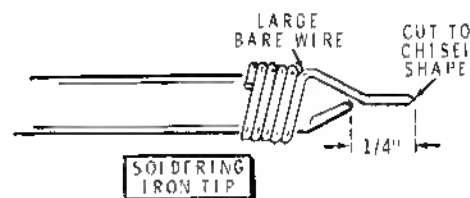
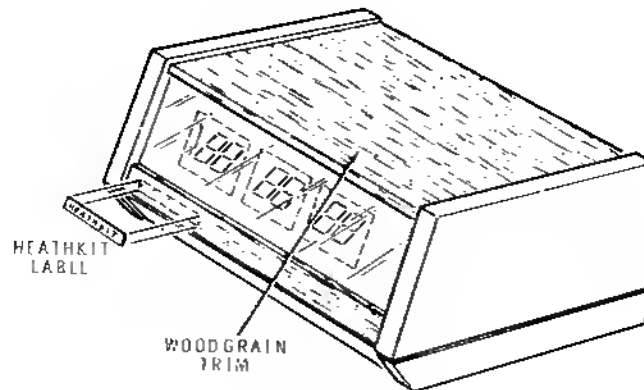


Figure 1

chisel shape as shown. Occasionally apply solder to the turns of large bare wire to achieve a good heat transfer.

- Resistors will be called out by their resistance value in  $\Omega$ ,  $k\Omega$ , or  $M\Omega$ , and color code.
- Capacitors will be called out by their capacitance value (in  $pF$  or  $\mu F$ ) and type (disc, mica, Mylar, or electrolytic).



PICTORIAL 6-1

## INITIAL TESTS

Refer to Figure 2 (fold-out from Page 23) to identify the function of each switch.

NOTE: If you do not obtain the proper results in any of the following steps, unplug the line cord plug and proceed to the "In Case of Difficulty" section on Page 22.

- ( ) Set the six switches to the positions shown.
- ( ) Plug the line cord plug into an AC outlet. Each of the six display digits should indicate an eight.
- ( ) Push the TIME HOLD switch to the right and back again. The display should now indicate 12:00:00 or 00:00:00 and start keeping time.
- ( ) Push the Alarm Set switch to the right. The display should now indicate 12:00:00 or 00:00:00 and the AM-PM lamp should be on.
- ( ) Push and hold the HOURS SET-AHEAD switch to the right. The HOURS DISPLAY will now advance one digit each half second. The AM-PM lamp will turn on and off each six seconds.
- ( ) Release the HOURS SET-AHEAD switch.
- ( ) Push and hold the MINUTES SET-AHEAD switch to the right. The MINUTES DISPLAY will now advance one digit each half second.
- ( ) Push both the MINUTES SET-AHEAD switch and the HOURS SET-AHEAD switch to the right. The tens of minutes will now advance one digit each half second.
- ( ) Push the MINUTES and HOURS SET-AHEAD switches as necessary until the MINUTES DISPLAY indicates 45 minutes; then quickly release the MINUTES SET-AHEAD switch.
- ( ) Continue holding the HOURS SET-AHEAD switch until the HOURS DISPLAY indicates 6 and the AM-PM lamp is on (indicating AM). Then quickly release the switch.
- ( ) Push the ALARM SET switch to the left.
- ( ) Push the ALARM ON-OFF switch to the ON (down) position.
- ( ) Push the TIME HOLD switch to the right.
- ( ) Push both the HOURS SET-AHEAD switch and the MINUTES SET-AHEAD switch to the right as necessary until the MINUTES DISPLAY indicates 44 minutes. Then quickly release the MINUTES SET-AHEAD switch.
- ( ) Continue holding the HOURS SET-AHEAD switch until the HOURS DISPLAY indicates 6 and the AM-PM lamp is on (indicating AM). Then quickly release the switch.
- ( ) Push the TIME HOLD switch to the left. The clock should now start keeping time and in approximately one minute the alarm should sound.
- ( ) When the alarm sounds, push the SNOOZE ALARM switch down (to reset the snooze alarm) and release the switch. In approximately seven minutes, the alarm should sound again.
- ( ) Push the ALARM ON-OFF switch up to the OFF position.

This completes the "Initial Tests."

## OPERATION

Figure 2 (fold-out from Page 23) points out the switches and displays of your Clock. These switches and displays are further described below.

1. **ALARM ON-OFF SWITCH** — Turns the alarm on and off. Down is on. **NOTE:** After the alarm sounds, if you wish, you may turn the alarm off and immediately return the switch to the ON position. The alarm will then sound 24 hours later.
  2. **SNOOZE ALARM SWITCH** — Resets the alarm to go off seven minutes later.
  3. **HOURS SET-AHEAD SWITCH** — Advances the HOURS DISPLAY one hour each half second.
  4. **MINUTES SET-AHEAD SWITCH** — Advances the MINUTES DISPLAY one minute each half second.
- 3 and 4. When used together, they advance the MINUTES DISPLAY ten minutes each half second.
5. **ALARM SET SWITCH** — Allows you to set the alarm using the HOURS and MINUTES SET-AHEAD switches. Also allows the display to indicate the time for which the alarm is set. (Time continues to be kept even though it is not displayed when this switch is being used.)
  6. **TIME HOLD SWITCH** — Allows you to set the Clock ahead to the desired time, using the HOURS and MINUTES SET-AHEAD switches, and then start the clock when the desired time arrives.
  7. **AM-PM LAMP** — Indicates AM when on and PM when off; only when setting the alarm or the time. The Lamp is not on during normal operation.

- 8, 9, and 10. **HOURS, MINUTES, and SECONDS DISPLAY** — Indicate the time or the time that the alarm is set for. Indicates all 8's when first plugged in or when power has been interrupted for several seconds.

### TO SET THE TIME:

1. Push the TIME HOLD switch to the right.
2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired — on is AM; off is PM.
3. Watch another clock. When the time gets to the time on the display, push the TIME HOLD switch to the left.

### TO SET THE ALARM:

1. Push the ALARM-SET switch to the right. (The clock will continue to keep time, even though the display is stationary.)
2. Push the MINUTES SET-AHEAD and HOURS SET-AHEAD switches (separately or together) as necessary to advance the display to a desired time. Be sure the AM-PM lamp is on or off as desired — on is AM; off is PM.
3. Push the ALARM-SET switch to the left.
4. Push the ALARM ON-OFF switch down to the ON position.

### FOR DAYLIGHT SAVINGS TIME:

1. Push the HOURS SET-AHEAD switch to the right and advance the HOURS DISPLAY to the desired hour. **NOTE:** To go back an hour, advance the display 23 hours.

## IN CASE OF DIFFICULTY

This section of the Manual is divided into two parts. The first part, titled "General Troubleshooting Information," describes what to do about the difficulties that may occur right after your Clock is assembled.

The second part, titled "Troubleshooting Chart," is provided to assist you in servicing the Clock if the "General Troubleshooting Information" fails to clear up the problem, or if difficulties occur after your Clock has been in use for some time. The "Troubleshooting Chart" lists a number of possible difficulties that could arise along with several possible solutions to those difficulties.

Try to analyze the symptoms of any problem you might have before starting any troubleshooting procedure. This can usually be accomplished by trying the various functions of your Clock to determine abnormal operations. A review of the "Operation" section above may help your analysis.

NOTE: Refer to the "Circuit Board X-Ray Views" on Pages 28 and 29 for the physical location of parts on the circuit boards.

### GENERAL TROUBLESHOOTING INFORMATION

1. Check all the wires that are connected between the two circuit boards and between the circuit boards and other parts. Trace each wire in colored pencil on the Pictorial as it is checked. Make sure these wires are connected to the proper points and are properly soldered. Someone who is not familiar with the unit may notice something you have consistently overlooked.
2. Be sure the IC is seated properly in its socket.
3. About 90% of the kits that are returned for repair do not function properly because of poor connections and soldering. Therefore, many troubles can be located by a careful inspection of connections to make sure they are soldered as described in the "Soldering" section of the "Kit Builders Guide." Reheat any doubtful connections.
4. Closely examine each circuit board foil in a good light to see that no solder bridges exist between adjacent connections. If available, a magnifying glass would be helpful for this purpose. Remove any solder bridges by holding a clean, hot soldering iron tip between the two points that are bridged until the excess solder flows down onto the tip. Compare your foil pattern against the "X-Ray Views" on Pages 28 and 29.

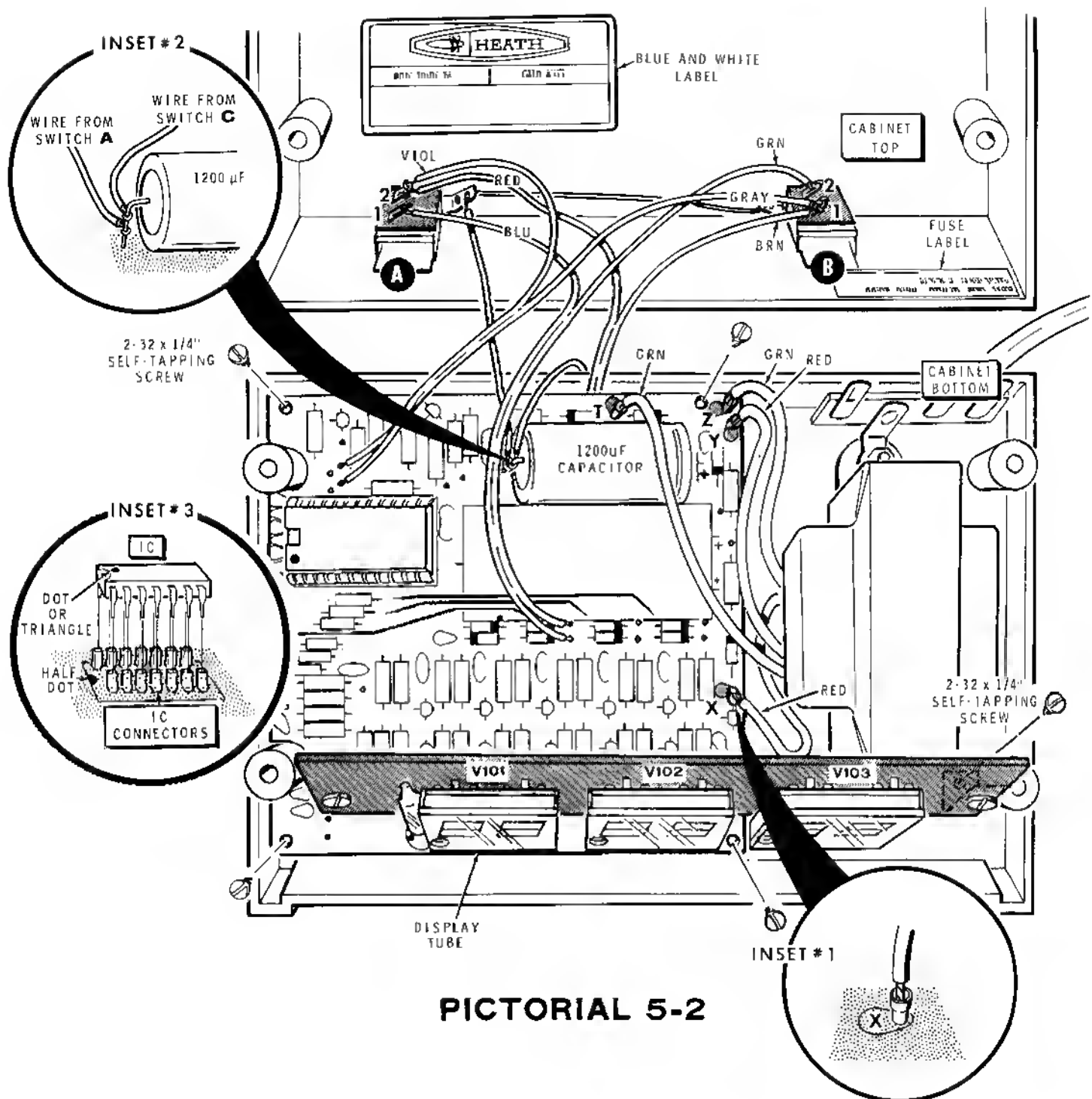
5. Be sure each transistor is in its proper location (correct part number and/or type number). Be sure that each transistor lead is in the right hole and has a good solder connection to the foil.
6. Check the integrated circuit for proper positioning. (Be sure the dot or notched end of the IC is over the half dot printed on the circuit board.)
7. Check each capacitor value. Be sure that a capacitor of correct value is installed at each capacitor location. Check each electrolytic capacitor to be sure the lead near the positive (+) marking is at the correct position.
8. Check each resistor value carefully. It would be easy, for example, to install a 2200  $\Omega$  (red-red-red) resistor where a 22 k $\Omega$  (red-red-orange) resistor is called for. A resistor that is discolored, or cracked, or shows any sign of bulging would indicate that it is damaged and should be replaced. Since damaged resistors are often the result of some other difficulty (such as faulty wiring), you should try to find out what caused the damage before you replace the part.
9. Be sure the correct diode is installed at each diode location, and that the banded end is positioned correctly.
10. Check all component leads connected to the circuit boards. Make sure the leads do not extend through the circuit board and come in contact with other connections or parts.

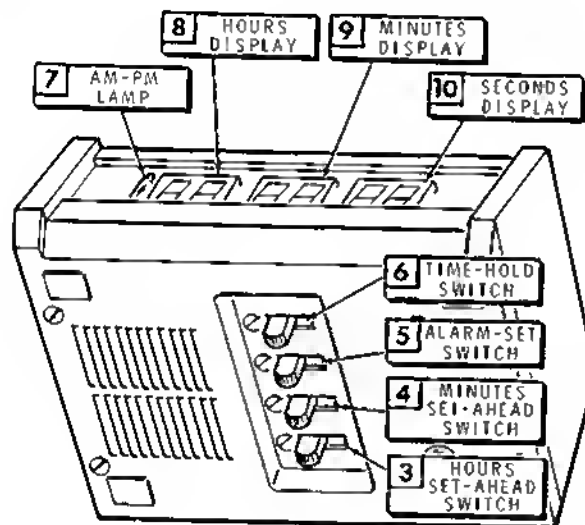
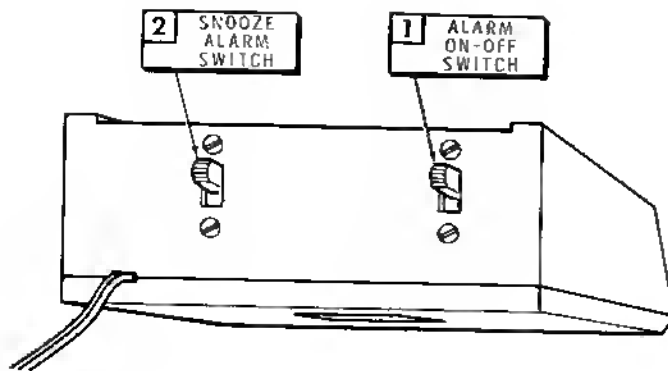
If you still cannot locate and correct the trouble after the above tests are completed, and if a voltmeter is available, check your Clock's voltages against the voltages shown on the Schematic Diagram (fold-out from Page 31) and in the "Circuit Board Voltage Charts" (Page 30).

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is located inside the front cover of the Manual.

**WARNING:** Hazardous voltages are exposed in the Clock when the cabinet top is removed and the line cord is plugged into the AC outlet. See "Chassis Photograph" on Page 27.



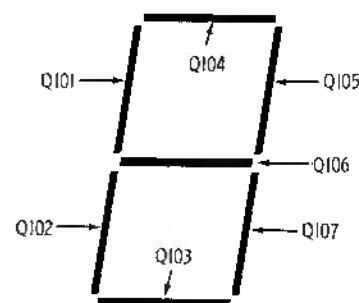




**Figure 2**

## Troubleshooting Chart

This chart lists the condition and possible cause of several malfunctions. If a particular part or parts are mentioned (Q107 for example) as a possible cause, check that part to see that it was installed and/or wired correctly. It is also possible, on rare occasions, for a part to be faulty and require replacement.



CONDITION	POSSIBLE CAUSE
A digit or a segment of digit does not light.	1. Check pins of that display tube.
The same segment of all six digits remains lit or does not turn on.	1. Associated transistor (Q101 through Q107). See above.
One digit does not light or has undesired segment glow.	1. Associated transistors (Q201 through Q212) as follows: V101B – Q211, Q212. V101A – Q209, Q210. V102B – Q207, Q208. V102A – Q205, Q206. V103B – Q203, Q204. V103A – Q201, Q202. 2. Display tube. Interchange tubes to see if tube is bad.
None of the digits light.	1. Diode D201. 2. Fuse F301. 3. Check for +15 volts at BX on circuit board. 4. ZD201. 5. D202. 6. IC201.
One digit lights up much brighter than others.	1. Associated transistor (Q201 through Q212).
Only one digit is turned on.	1. IC201.
Time or alarm cannot be set.	1. Diodes D204 through D211. 2. Switch S301 through S306. 3. IC201.

CONDITION	POSSIBLE CAUSE
Time does not advance.	<ol style="list-style-type: none"> <li>1. Diode O203.</li> <li>2. IC201.</li> </ol>
Alarm does not work properly.	<ol style="list-style-type: none"> <li>1. Switch S305 or S306.</li> <li>2. Diode O208 or D209.</li> <li>3. Transistor O214.</li> <li>4. Speaker SP301.</li> <li>5. IC201.</li> </ol>
AM-PM lamp does not turn on.	<ol style="list-style-type: none"> <li>1. Lamp is not normally on. See Page 22.</li> <li>2. Switch S301 or S302.</li> <li>3. Transistor O213.</li> <li>4. V201.</li> <li>5. Resistors R218, R219, or R220 interchanged.</li> </ol>
Clock gains time.	<ol style="list-style-type: none"> <li>1. 50 Hz jumper wire was installed. See Page 11, left-hand column, step 5.</li> </ol>

## SPECIFICATIONS

Display . . . . .	Six full digits.
Format . . . . .	12 or 24 hour.
Accuracy . . . . .	Determined by accuracy of power line frequency.
Snooze Alarm . . . . .	Seven minute intervals.
Power . . . . .	6.5 watts, 120 VAC or 240 VAC, 50 Hz or 60 Hz.
Dimensions . . . . .	7" wide x 5" deep x 2-1/2" high.
Weight . . . . .	3 lbs.

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

## CIRCUIT FUNDAMENTALS

The following fundamentals will give you a better understanding of the circuit relationships in your Clock and describe how the circuits work together. Refer to the Schematic Diagram (fold-out from Page 31) while you read the following information.

All the digital logic is performed inside of IC201. The remaining circuitry supplies the DC power and responds to the commands from IC201 to drive the speaker and the display tubes.

Resistor R204 and capacitor C201 are the timing components for the oscillator inside IC201. The oscillator scans (applies a positive driving pulse to first D1, then D2, then D3, etc.) outputs D1 through D6 in rapid succession. At the correct times, positive pulses are applied to the proper pins (9 through 15) of IC201 to turn on the correct digits in the proper display tubes.

**Example:** Consider the time 08:56:21.

As a positive pulse is applied to D1 (which turns on transistors Q201 and Q202, and applies 230 volts to the anode of tube V103, part A), positive pulses are also applied to pins 13 and 14 of the IC. These pulses at pins 13 and 14 turn on transistors Q106 and Q107, which turn on segments b and c of the display tube, and a one is displayed. The other digits (of V103, V102, and V101) do not light up because they do not have a high enough voltage at their anodes.

The positive pulse is then applied to D2, and part B of tube V103 receives the high anode voltage. At this same time, positive pulses are also applied to pins 9, 11, 12, 14, and 15 of the IC. This turns on segments a, b, g, e, and d, and a two is displayed.

Next, positive pulses are applied to D3 and pins 9, 10, 11, 12, 13, and 15 of the IC, and a six is displayed in part A of V102. The scanning continues through D6 and then starts over. This happens so fast that all six digits appear to be on at once.

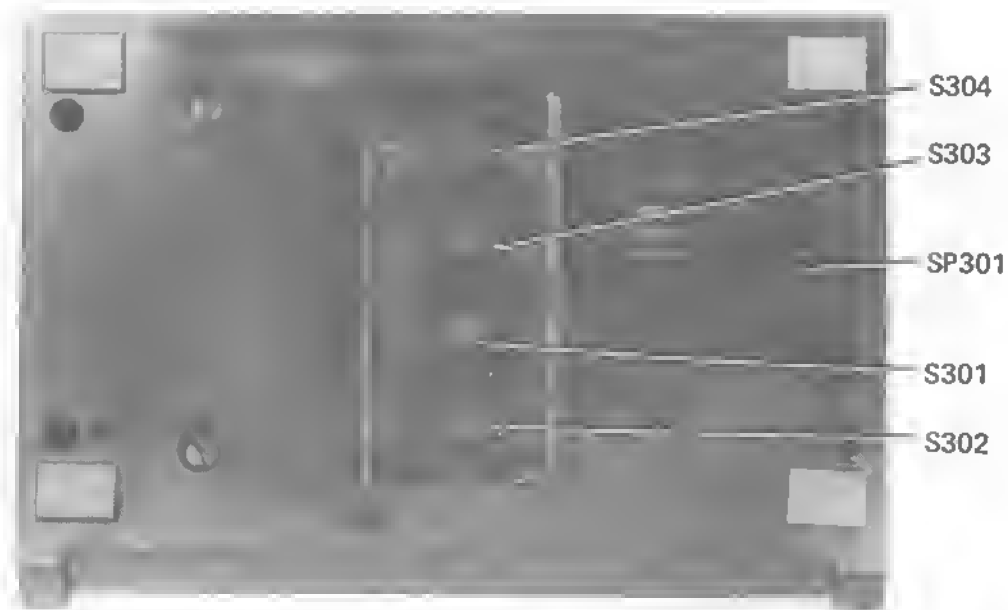
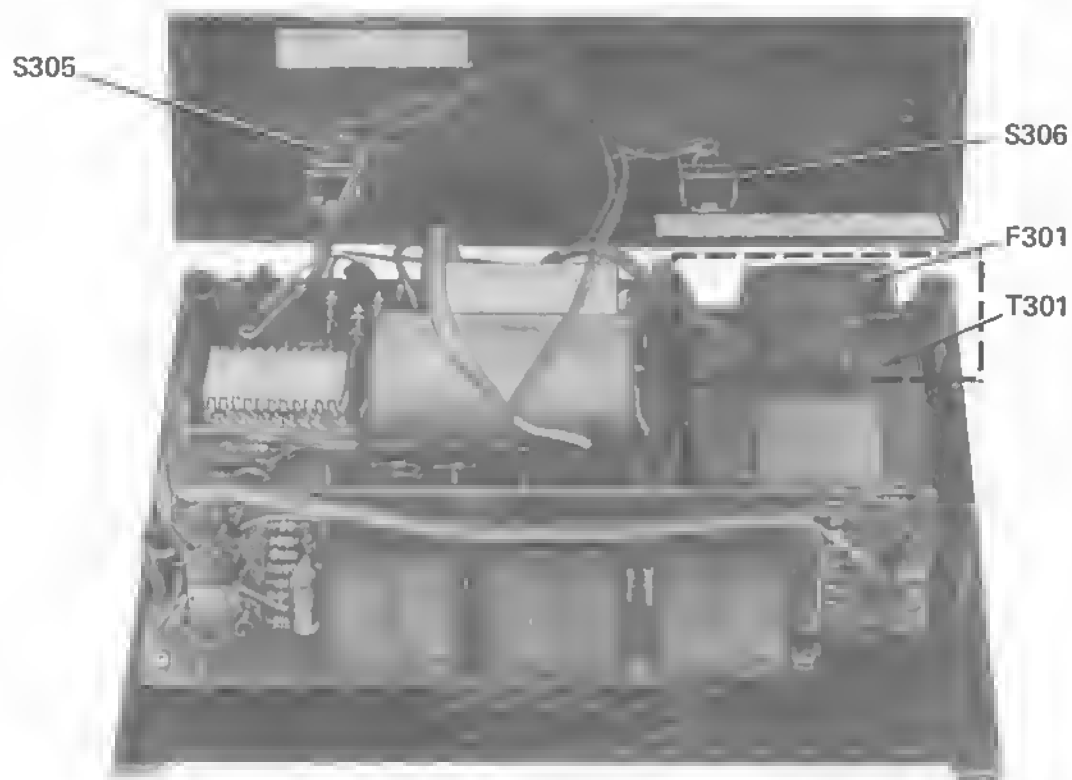
Transistor Q213 turns on lamp V201 at the proper time when the alarm or time is being set, and transistor Q214 drives the speaker, SP301.

Diodes D204 through D211 are a diode matrix to keep the DC voltages on their own control lines. (D1 through D6 are the control lines.)

Dual-primary transformer T301 can be wired to operate from either 120 VAC or 240 VAC. Two secondary windings furnish the voltage required by the Clock. Diode D201 forms a half-wave rectifier, and capacitor C203 and resistor R211 filter this voltage that drives the display tubes. Diode D202, resistor R210, and capacitor C204 also are a rectifier and filter circuit, and zener diode ZD201 maintains the proper operating voltage for IC201. Diode D203 is another rectifier and, along with resistors R209 and R208, provides the proper 50 or 60 Hz signal to act as the Clock's reference frequency. Capacitor C202 is a filter capacitor.

## CHASSIS PHOTOGRAPH

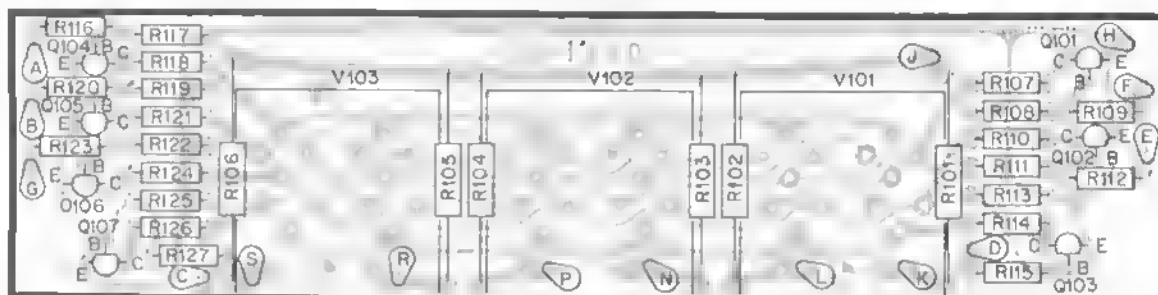
**WARNING:** Boxed in area indicates hazardous voltage location.



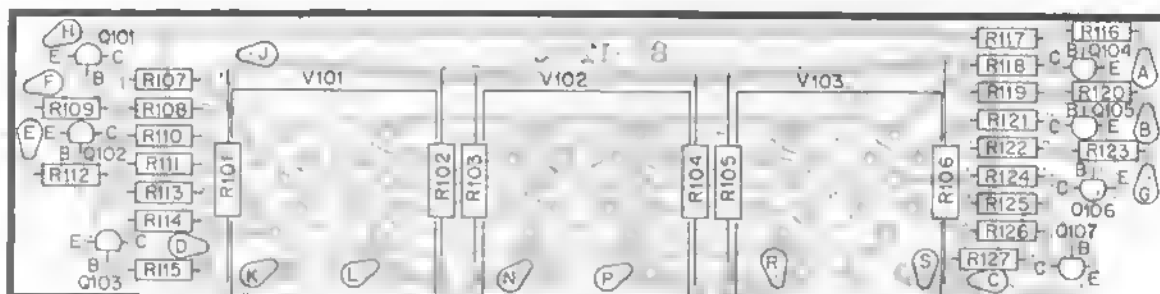
## CIRCUIT BOARD X-RAY VIEWS

NOTE: To identify a part shown in one of these Views, so you can order a replacement, proceed in either of the following ways:

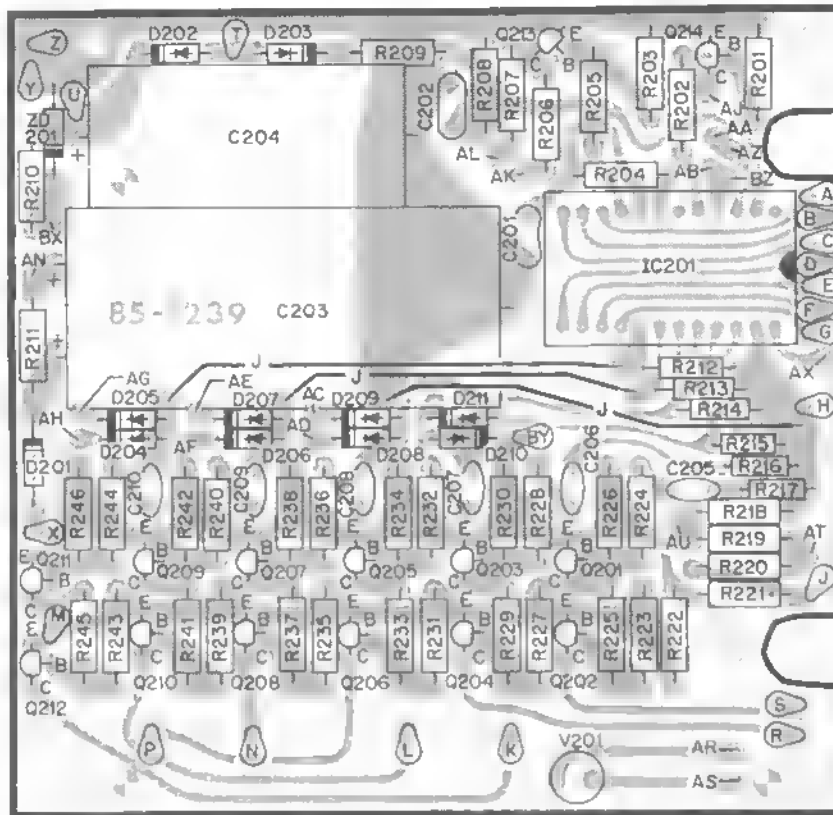
1. A. Refer to the place where the part is installed in the Step-by-Step instructions and note the "Description" of the part (for example: 22 k $\Omega$ , .05  $\mu$ F, or 2N2712).
  - B. Look up this Description in the "Parts List."
2. A. Note the identification number of the part (R-number, C-number, etc.).
  - B. Locate the same identification number (next to the part) on the Schematic. The "Description" of the part will also appear near the part.
  - C. Look up this Description in the "Parts List."



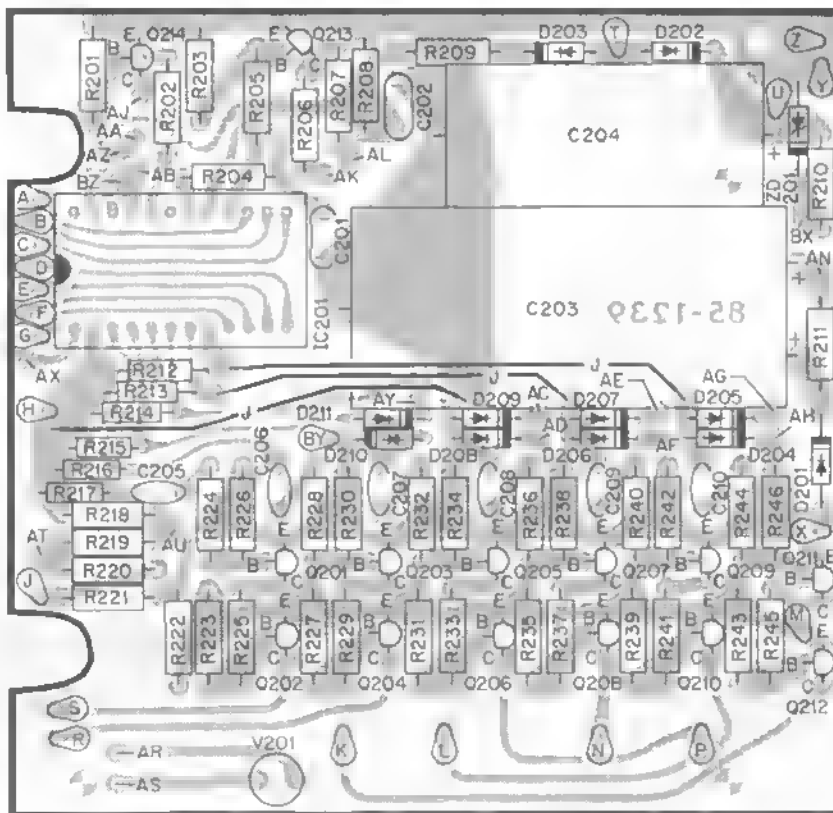
**DISPLAY CIRCUIT BOARD**  
(Viewed from foil side)



**DISPLAY CIRCUIT BOARD**  
(Viewed from component side)



MAIN CIRCUIT BOARD  
(Viewed from foil side)

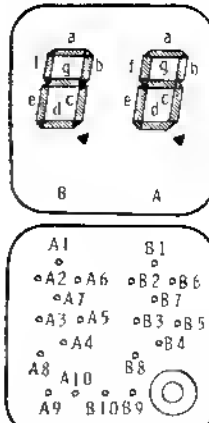
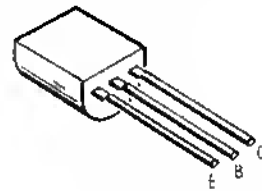




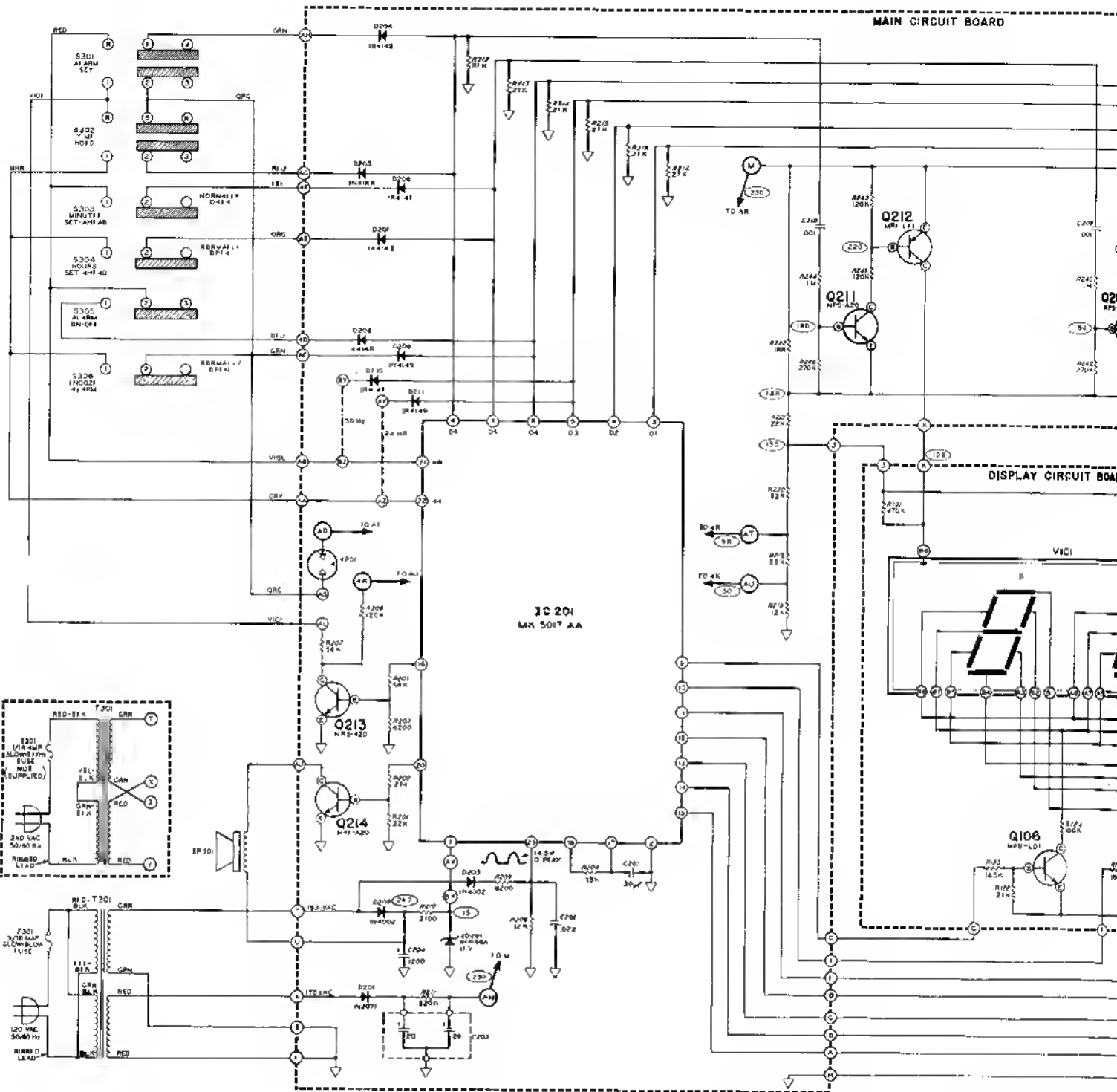
MAIN CIRCUIT BOARD  
(Viewed from component side)





# IDENTIFICATION CHART

COMPONENT	HEATH PART NUMBER	MAY BE REPLACED WITH	IDENTIFICATION																						
V101, V102, V103	411-286	SPERRY RAND SP-352	 <p>VIEWED FROM FRONT</p> <p>VIEWED FROM BACK</p> <table border="1"> <thead> <tr> <th>SIGNATURE</th><th>PIN NUMBER</th></tr> </thead> <tbody> <tr><td>a</td><td>1</td></tr> <tr><td>b</td><td>2</td></tr> <tr><td>c</td><td>3</td></tr> <tr><td>d</td><td>4</td></tr> <tr><td>e</td><td>5</td></tr> <tr><td>f</td><td>6</td></tr> <tr><td>g</td><td>7</td></tr> <tr><td>h</td><td>8 (NOT USED)</td></tr> <tr><td>A100F</td><td>9</td></tr> <tr><td></td><td>10 (NOT USED)</td></tr> </tbody> </table>	SIGNATURE	PIN NUMBER	a	1	b	2	c	3	d	4	e	5	f	6	g	7	h	8 (NOT USED)	A100F	9		10 (NOT USED)
SIGNATURE	PIN NUMBER																								
a	1																								
b	2																								
c	3																								
d	4																								
e	5																								
f	6																								
g	7																								
h	8 (NOT USED)																								
A100F	9																								
	10 (NOT USED)																								
Q201, Q203, Q205, Q207, Q209, Q211, Q213, Q214	417-801	MPS-A20																							
Q202, Q204, Q206, Q208, Q210, Q212	417-295	MPS-151																							
Q101-Q107	417-811	MPS-101																							
ZD201	56-25	1N4156A ZENER DIODE, 15V, 17 mA	<p>NOTE: HEATH PART NUMBERS ARE STAMPED ON MOST DIODES.</p> 																						
D204-D211	56-56	1N4149 SILICON DIODE, 75V, 10mA																							
D201	57-27	1N2071 SILICON DIODE, 600V, 1A																							
D202, D203	57-65	1N4002 SILICON DIODE, 100V, 1A																							
IC201	443-607	MK5017AA	 <p>TOP VIEW</p>																						





SCHEMATIC OF THE  
HEATHKIT<sup>®</sup>  
ELECTRONIC CLOCK  
MODEL GC-1005

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS X-1000, M=1,000,000
2. ALL CAPACITOR VALUES ARE IN  $\mu$ F UNLESS MARKED OTHERWISE
3.  $\nabla$  THIS SYMBOL INDICATES A CIRCUIT BOARD GROUND

4.  $\bigcirc$  THIS SYMBOL INDICATES A LEAD CONNECTION.
5.  $\bigcirc$  THIS SYMBOL INDICATES A DC A HIGH INPUT IMPEDANCE VOLT INDICATED TO GROUND VOLT APPLIED WITH IC201 PLM0V

4.  THIS SYMBOL INDICATES A FILTERED CIRCUIT BOARD CONNECTION.
5.  THIS SYMBOL INDICATES A DC VOLTAGE MEASURED WITH A HIGH INPUT IMPEDANCE VOLTMETER FROM THE POINT INDICATED TO GROUND. VOLTAGES MAY VARY  $\pm 10\%$  AND ARE TAKEN WITH  $\pm 20\%$  REMOVED.